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OIL: BIG WORD IN ALBERTA'S FUTURE—Another New Edmonton Refinery Will Add to the Province's Daily Petroleum Output, Enough to Fill 1,000 Railway Tank Cars

49 NATIONAL GEOGRAPHIC PHOTOGRAPHER J. BAYLOR ROBERTS

coveries, Alberta's coal resources make up almost half Canada's total—enough to last 1,200 years. Oilmen say 250,000,000,000 barrels of petroleum lie untouched beneath sands along Athabasca River in Alberta's remote northland.

This "Texas of Canada," almost as big as its United States counterpart, produces all but about a tenth of Canada's natural gas. Some $90,000,000 in petroleum revenue pours into Alberta's treasury yearly; government leaders predict oil and gas income may double, eliminating city, school, and hospital taxes.

Tall derricks and rocking-arm pumpers sprout from prairie farmland, for Alberta still ranks as one of Canada's leading breadbasket provinces. In central Alberta fertile black topsoil, sometimes a foot thick, yields wheat, oats, barley, rye—some 300,000,000 bushels annually. Across the grassy southern belt, cattle graze from the Saskatchewan border westward to the Canadian Rockies where peaks jut sharply from the plains.

Farm products ready for processing stream into factories of Edmonton and Calgary. So keen is rivalry between Alberta's two leading cities that a visiting British poet once observed, "It is imperative to praise Edmonton in Edmonton. But it is sudden death to praise it in Calgary." But the friendly competition reflects Alberta's rapid growth.

Scarcely more than a trading post before 1900, Edmonton today has zoomed past the 200,000 population mark. Each month brings 1,200 new residents to this "Gateway to the North" where oil refineries and factories

CANADIAN ROCKY PEAKS Surround the Little Town of Banff Where a Castlelike Hotel Overlooks Bow River in Banff National Park, One of Alberta's Vacationlands

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RALPH GRAY, NATIONAL GEOGRAPHIC STAFF

CANADA'S FASTEST-GROWING CITY—Edmonton, Alberta's Capital, Overlooks North Saskatchewan River; the Province Legislature Meets in the Domed Parliament Building

Alberta, Canada's Texas, Marks 50th Birthday

Under a cold gray February sky, a steel-helmeted drilling crew went about work as usual near the little town of Leduc, Alberta. They shivered around an ice-crusted drilling rig. For a decade drillers like them had punctured holes in the near-by Canadian countryside, hoping for oil, but finding little. It seemed a 25-year oil search in the area would end in failure.

Suddenly a black geyser shot skyward. "We've hit it!" excited drillers cried, forgetting the cold. Thick crude oil sprayed down on them. Streams of it blackened freshly fallen snow, but brightened Alberta's future. For in the eight years since that fabulous find, Alberta, Canada's fourth-largest province, has mushroomed into the country's oil and natural-gas center.

Now oil gushes through pipelines linking Edmonton, Alberta's thriving capital, with the Great Lakes and with Vancouver on the Pacific coast.

Standing on the threshold of a glittering era, Alberta, along with its eastern neighbor, Saskatchewan, celebrates its golden jubilee this year. Little more than an empty wilderness half a century ago, the province is just beginning to tap its wealth. Though eclipsed by oil and gas dis-

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Ethiopia Celebrates Emperor's Long Reign

This week, in the high and still-mysterious land of Ethiopia, the Conquering Lion of the Tribe of Judah celebrates his silver jubilee. On November 2, 1930, His Imperial Majesty Haile Selassie I, attired in a costume of gold, was crowned with a diadem worth $6,000,000. Today the usual dress of this hard-working monarch is a British Army-style uniform adorned with many medals, some won on the actual field of battle.

Addis Ababa's streets will be gay with visitors in traditional costumes of the kingdom's 12 provinces. Townsfolk in *shammas* (the white toga-like garment still worn by many modern Ethiopians), Army and Air Force officials, and tourists will throng the Cathedral of St. George for services of commemoration and thanksgiving. Through the city's winding, eucalyptus-shaded streets will march a stirring military parade, and an Air Force fly-past will streak across the sky.

The royal house of Ethiopia claims descent from King Solomon and the Queen of Sheba. It boasts 2,000 years of recorded history, and many more trailing back into the hazy past before historians took pen in hand. Homer, eight centuries B.C., wrote of the "Aethiopes" (sunburnt men). Three centuries later Herodotus, "father of history," described the country. Ethiopian leaders embraced Christianity about A.D. 330. When Moslems swept westward in the eighth century to convert all north Africa to their faith, Ethiopians, on their rugged plateau protected by natural fortifications of forest and desert, resisted as fiercely as their descendents, centuries later, fought the Fascist army of Mussolini.

Ethiopia became an island of Christianity in a Moslem sea. From the Venetian, Marco Polo, and Vasco da Gama, Portuguese explorer, Europeans heard vague tales of a great kingdom in a remote northeast African land. The cloak of mystery shrouded the country until the 19th century. Then Menelik II, a predecessor and cousin of Haile Selassie, began tearing it aside, encouraging foreigners to visit his secluded realm and his subjects to travel abroad.

When Haile Selassie came to the ancient throne he continued this trend. Sons and daughters of the royal family studied at English schools and universities.

FROM FORREST FINLEY AND ASSOCIATES

EMPEROR-SCHOLAR, in His Palace Library, Keeps up with the Changing World Beyond His Remote Realm

RALPH GRAY, NATIONAL GEOGRAPHIC STAFF

BLANKETED WITH GOLDEN GRAIN, Rich Farmland Like This Field near the Town of Grande Prairie Makes Alberta Canada's Second-Largest Wheat-Producing Province

dot the sprawling city on bluffs along the North Saskatchewan River.

Great railway yards mark Calgary, Alberta's southern industrial center boasting some 250 factories. Coal, lumber, farm products from a 150,000-square-mile area descend on the city. But for a week every year Calgary turns from business to entertainment when thousands of visitors jam the city for the Calgary Stampede, world-famous rodeo.

Close by lies the snow-capped backbone of the Canadian Rockies, shared by Alberta with British Columbia. At least 70 peaks reach 10,000 feet. Part of Alberta's million yearly visitors ski in winter, swim and fish in summer in Banff and Jasper National Parks amid the mountains. Far to the northeast, across vast stands of virgin timber, buffalo, deer, moose, and waterfowl find refuge in Wood Buffalo National Park.

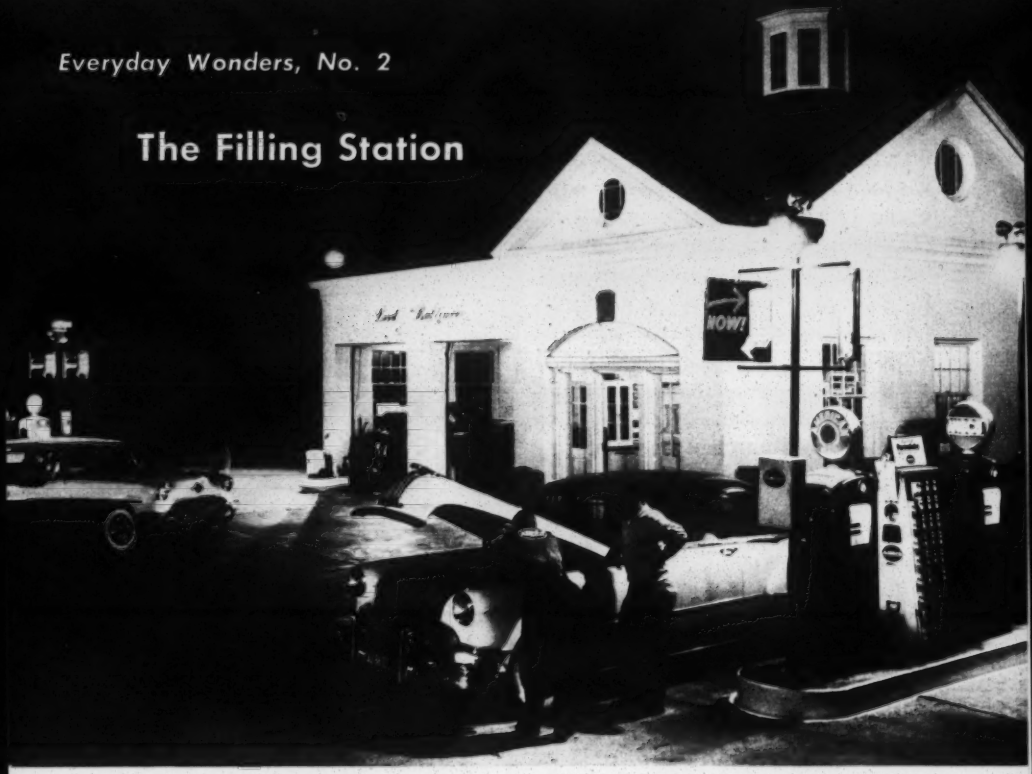
Northern wilderness country of lakes and forests covers more than half the province. To some 1,000,000 progressive Albertans it provides opportunity for future expansion. Productive forest land, double the area of Pennsylvania, already yields valuable timber—spruce, fir, pine, balsam, birch. Freight for mineral development moves northward on the Athabasca River; farmers invade Peace River valley to settle northlands. As in Alberta's early days, trappers roam woodlands for still-plentiful beaver, fox, muskrat, ermine, and mink. Already wealthy with known resources, Alberta looks to its challenging north country—and to the next 50 years—as a promise for even greater prosperity.

Next week: *Saskatchewan Exults in 50 Years as a Province.*

National Geographic References: ***Map***—Canada, Alaska & Greenland (paper 50¢)
Magazine—Aug., 1955, "Across Canada by Mackenzie's Track" (school price 55¢)
School Bulletins—Feb. 21, 1955, "Rivers of the World: The Mackenzie" (10¢)

Everyday Wonders, No. 2

The Filling Station



NATIONAL GEOGRAPHIC PHOTOGRAPHER WILLIAM W. CAMPBELL, III

The fuel-gauge needle hovers on the quarter-full mark. The salesman-driver, with 170 miles to cover before morning, knows he won't make it on four gallons, but does he worry?

You might think he would, with 61,000,000 other vehicles gulping gasoline on United States highways. But one of the miracles of modern distribution and servicing—the filling station—allows the salesman to greet his dilemma almost with boredom. He spots a familiar road sign, swings onto a wide, paved apron where brightly colored pumps stand on a raised "island." As he approaches, a bell rings inside a sparkling clean building and a coveralled attendant appears.

Within minutes the salesman is off into the night. His windshield is clean, his gauge reads "Full," he is sure of his radiator, motor oil, and battery water. The roadside service station, enacting a role so routine and humble that it goes almost unnoticed and unappreciated, has done its job again.

People sometimes say, "You can always find a filling station except when you're out of gas." Yet 201,500 gasoline dealers scattered over the United States—one for about every 14 miles of open road—would seem enough to keep every tank full. Because they offer a good deal more than gas and oil, "service station" is a more proper term. Take, for example, the one where the salesman stopped.

It abuts a main highway at the edge of town, so benefits both from

FREDERICK J. SIMOONS

HEAVY TRAFFIC AT HARAR—Gallas, Somalis, Arabs, and Automobiles Pass the Old Gateway to This Walled Market Center in Ethiopia's Fertile Eastern Province

Today more than 400 young Ethiopians attend Western universities; most in the United States, Canada, and England; a few in France, Germany, and Switzerland. Sweden is offering technological scholarships to 15 Ethiopian students. More than 200 foreigners of 17 different nationalities are teaching in Ethiopia's schools.

Ethiopia welcomes assistance in many fields from many nations. A Belgian military mission trained officers for the Imperial Guard. Cadets have attended St. Cyr (France's West Point). American experts lend know-how in agriculture, public health, and engineering. Egypt's Coptic priests teach in the theological seminary that Haile Selassie established (most of the Christians in both countries belong to the Coptic sect).

The Amharas, Ethiopia's ruling class, are Christian, but there are many Moslems and pagans among the Gallas, a pastoral people who comprise more than half the population.

Ethiopia's adequate rainfall and fertile soil, the temperate climate of its high plateaus, make it primarily an agricultural nation. Good farming techniques have stepped up coffee production to such an extent that exports of the nation's most important crop have quadrupled during the past year.

National Geographic References: ***Map***—Northern Africa (paper 50¢, fabric $1)
Magazine—Dec., 1954, "Safari from Congo to Cairo" (school price 55¢)
School Bulletins—May 10, 1954, "Ethiopia's Ruler to Visit America" (10¢)

In the small "store" inside, Joe sells everything from flashlights to plastic windshield scrapers. Helpers know their job calls for salesmanship as well as mechanical ability. Vending machines offer soft drinks, candy, cigarettes. A pay telephone is handy.

Free services help keep Joe's customers coming back. He'll charge for a complete car wash, but not for cleaning the windshield of every driver who stops for gas. Joe not only offers free road maps, but is always ready to direct strangers to South Center Street or the back mountain road to Middleville. And, as a final touch, he'll wheel out a vacuum cleaner to suck dirt from floorboards and empty crammed ash trays.

Joe's service station earns him a tidy profit, but it's not a big business. Ten miles away a super-service station pumps 60,000 gallons of gas a month, stands ready to tackle complete repairs and supply a vast variety of automotive parts. Sporting equipment, hardware, toys, and souvenirs are on sale and an adjoining cafe feeds tourists. There's even talk of building a motel.

But primarily, Joe and his competitors work to keep rubber-tired wheels turning on United States highways—and on tractor-chewed soil—by helping sell 44,000,000,000 gallons of gas a year. Spouting from a pipe two feet in diameter, at the rate of 10 gallons a second, that much gasoline would take 136 years to pass the nozzle.

When the first awkward, unreliable automobiles began wheezing along muddy American roads toward the end of the last century, people greeted them with somewhat scornful amusement. These noisy, evil-smelling machines, forever breaking down, might be interesting mechanical toys for the wealthy. Surely they would never replace the horse! If they did, what of the hundreds of livery-stable men they would put out of work? But the plaything grew in efficiency—and in popularity. Blacksmiths found a new side line in selling cans of gasoline to daring, duster-clad motorists who stored extra fuel in spare tanks.

In 1907, an oil salesman in Seattle, Washington, attached a hose to a tank of gasoline and began selling measured amounts to any motorist who drove up. Shortly he found his idea was drawing so many customers that they formed a three-blocks-long waiting line in their panting, fuel-thirsty vehicles. From such early filling stations has come a business which employs more than half a million Americans and serves some 36,000,000 car-owning families in the United States. Save for houses and barns, no structure is more typical of the American scene than a service station. Yet, today, few motorists stop to marvel at the familiar roadside establishments that help maintain this automotive age.

EDWARDS PARK, NATIONAL GEOGRAPHIC STAFF.

"TAKE YOUR SECOND RIGHT"—Filling-Station Attendants Stand Ready to Direct Lost Motorists. In the United States They Give Away 100,000,000 Road Maps a Year

transient and local trade. The salesman chose it because it was handy. Townspeople speak of it as "Joe's" and many are regular customers, bringing their cars in for periodic lubrication, often buying tires, batteries, or accessories from Joe's assortment. Wise in business ways, Joe sends postcards to his "regulars" gently reminding them that they have probably driven 1,000 miles since the last lubrication. Joe does about nine "lube jobs" a day. Both his hydraulic lifts are kept busy, hoisting cars high on shining steel columns so that Joe and his helpers can get underneath with grease guns.

Joe has five men working with him. Two are experienced mechanics; one is a beginner, learning fast; two are high school boys, working part time. All take advantage of the training school run by the oil company whose products they sell. Joe started in business by leasing the station from the company. Now he owns it outright, hires his own help, expands as he sees fit. His station is equipped to test and clean spark plugs, align wheels, charge batteries, fix punctures, make many repairs. But nearly three quarters of his gross profits come from the sale of petroleum products.

ROBERT L. BREEDEN, NATIONAL GEOGRAPHIC STAFF

"THE OIL'S RIGHT UP TO THE MARK"—Yet One of the Next Four Cars to Drive in Will Probably Need Some. Selling Oil Means Profits, While Cleaning Windshields (below), a Free Service, Brings Local Customers Back

EDWARDS PARK, NATIONAL GEOGRAPHIC STAFF

Joe sells about 30,000 gallons of gas a month and finds that one out of every five cars needs oil. Huge underground storage tanks hold the gasoline. Company trucks carrying perhaps 5,000 gallons refill them. Cans of oil fill display racks beside pumps. Because trucks use the highway, Joe has installed a special pump for diesel fuel. He also keeps a barrel of kerosene for anyone who wants it and "white" unleaded gasoline for campstoves and outboards.

so useful to further exploration of the sky that, as one scientist put it, "It is as if Columbus were bringing back aerial photographs of all of North America from his first voyage in 1492."

The new atlas has revealed things never known before. New comets have been found near the earth. One faint wanderer circles the sun in only two and a third years. Asteroids, mountain-size chunks of rock, have been spotted flying through the solar system like baby planets. One cuts across the earth's orbit. Although six others like it exist, astronomers say they're not apt to collide with the earth.

Our sun belongs to that wheel-shaped aggregation of countless stars we call the Milky Way. It is a galaxy—one of many. How many, we didn't know until the Sky Survey revealed literally hundreds of millions of galaxies. Some are flat and round like ours, with arms spiraling out as from a Fourth of July pinwheel. Others are egg-shaped or spherical.

Sometimes galaxies form clusters. Before the Sky Survey began, a scattering of fewer than 40 such clusters of galaxies were known by astronomers. Now about 1,000 have been mapped. More may be pinpointed as scientists study Sky Atlas plates in years to come.

Radio astronomers have recently been investigating radio signals coming from outer space. Now, thanks to survey plates, some of these mysterious impulses are known to arise when galaxies collide.

Greatest usefulness of the Sky Atlas lies ahead—in answering unsolved questions. For instance, astronomers suspect that new stars are constantly being born as others burn out and die. Clouds of matter in space may form as particles are pushed together. Finally, the density of the matter would increase temperature until the new object blazed out with light. This theory can now be checked by comparing areas of the Sky Atlas with future pictures of the same regions.

Sometimes stars explode into greatly increased brilliance. These are the "novae" and "supernovae," the latter millions of times brighter than our sun. Already reference to the Sky Survey map has uncovered at least one new supernova.

By revealing such a star's

NATIONAL GEOGRAPHIC PHOTOGRAPHER EDWIN L. WISHERD

TAKING AIM AT THE STARS—
A Gigantic Wide-Angle Camera, Big Schmidt Lifts Its Lens Toward the Heavens Whose Known Boundaries It Has Pushed Back 4,000 Billion Billion (4, with 21 zeros) Miles

SAN DIEGO-CALIFORNIA CLUB

FRONT-ROW SEAT FOR ALL-STAR SHOW—From This Dome, Palomar's Huge Hale Telescope Will Peer Far into Sections of Sky Already Mapped by the Big Schmidt

Sky Survey: An Atlas of the Universe

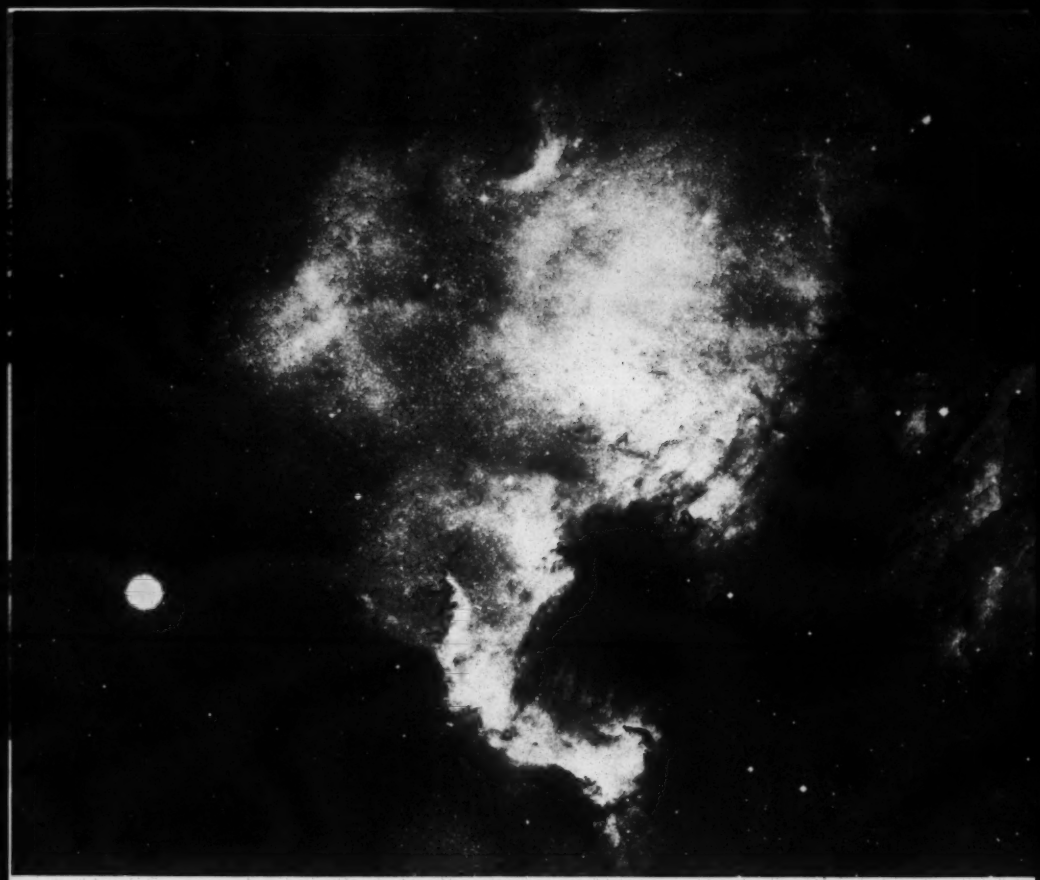
By John Oliver La Gorce

President of the National Geographic Society and Editor of Its Magazine

Some 1,800 years ago, Ptolemy, the great Alexandrian astronomer, listed the positions of 1,022 stars in the sky. Today the National Geographic Society, California's Palomar Observatory, and the California Institute of Technology are finishing a seven-year survey of the heavens that reveals so many billions of stars that they may never be counted. The first section of the farthest-reaching map ever attempted has been published. It reveals celestial bodies so far away that light flashing from them at 186,000 miles each second must travel for 600,000,000 years in order to be seen on earth.

The telescope that made the Sky Survey possible is known to astronomers as the Big Schmidt. It's actually a huge, wide-angle camera with a lens four feet across. With this wide "eye," the Big Schmidt captures on one photographic plate a sweep of sky as large as the bowl of the Big Dipper—while recording stars a million times fainter than the faintest one the human eye can see. This massive camera could catch the gleam of a candle 10,000 miles away.

The completed atlas of the heavens will include 1,758 prints covering 879 sections of sky. Laid out flat they would cover a tennis court. Already the first volumes of pictures are being sent to observatories, universities, and scientific institutions throughout the world. They will prove



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A CONTINENT IN THE SKY—First Sky Survey Print Shows North American Nebula, Continent-Shaped Cloud of Gas and Dust Lit by the Star Xi Cygni, Left

color, temperature, and brightness, the atlas may indicate the cause of the flare-up and show astronomers what types of stars are most likely to explode. "It would be of considerable interest," said a member of the Sky Survey staff drily, "to know whether our own sun is a star of the type that may explode someday."

One of the greatest questions is whether the entire universe is expanding. The Sky Survey, so far, seems to show that clusters of galaxies are moving away from each other rapidly. If all distant bodies are moving apart, it should be possible to calculate backward and learn how long ago they all started from a common center in some cataclysmic "birth of the universe."

The Sky Survey is the closest thing yet devised to what Dr. Gilbert Grosvenor, Chairman of the Board of Trustees of the National Geographic Society, calls "a portrait of creation."

(ADAPTED BY PERMISSION FROM THE NEW YORK TIMES MAGAZINE)

National Geographic References:

Magazine—Aug., 1955, "Completing the Atlas of the Universe" (school price 55¢)
Feb., 1952, "Our Universe Unfolds New Wonders" (75¢)
Sept., 1950, "Mapping the Unknown Universe" (75¢)

School Bulletins—Mar. 7, 1955, "Radio Stars Broadcast from Outer Space" (10¢)